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Kharghar, Navi Mumbai - 410 210.

Civil Engineering

Vision:

"To impart quality technical education beneficial to industry and the society in thefield of Civil Engineering.".

Mission:

- To arrange academic and technical expertise**.**
- To improve the practical knowledge of the student as per current scenario of industry.
- To make the students socially and ethically responsible.

Subject Name: Strength of Materials (313308) **Date:-**

Assignment No: - 1 **Course Outcome: C301.1**

Topic Name: - Moment of Inertia

Q.1 Calculate the M.I. of a T section about the centroidal axis x-x. Top flange is 1200 x 200 mm & web is 1800 mm x 200 mm. Total height is 2000 mm.

Q.2 Find the M.I. of an inverted T section having the flange 100 mm x 30 mm & web 120 mm x 30 mm.

Q.3 A rectangular beam section has width of 200mm and depths of 300mm. Using parallel axis theorem calculate M.I. @ its base.

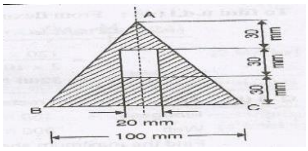
Q.4 A hollow square has inner dimensions 80×80 mm and outer dimensions 120 mm × 120 mm. Find the moment of Inertia about the outer size.

Q.5 Define: i) Moment of Inertia and ii) Radius of Gyration.

Q.6 A hollow circular section with 220 mm external diameter and 110 mm internal diameter. Calculate the moment of Inertia of the section about any of its tangent. Also, find polar moment of Inertia.

Q.7 State Parallel and Perpendicular Axis Theorem.

Q.8 A rectangular hole is made in a triangular section as shown in figure. Determine the M.I. of



Date of Submission :-

Assign By :- Dr.D.R.Suroshe

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Subject Name: Strength of Materials (313308) **Date :-**

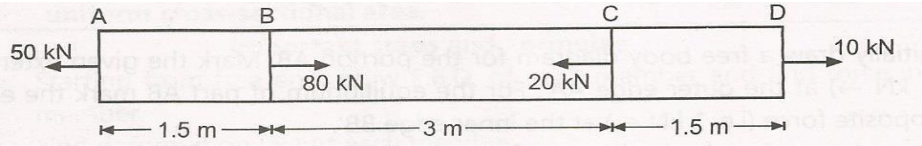
Assignment No: - 2 **Course Outcome: 301.2**

Topic Name: - Simple Stresses, Strains and Elastic Constants

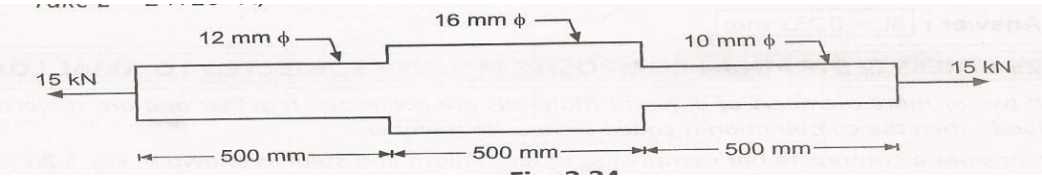
Q.1 A wire 4 mm in diameter , 4m long & subjected to an axial pull of 1890 N is stretched by 3 mm under the axial pull. find the stress , strain induced. also find young modulus of elasticity.

Q.2 A steel rod of 25 mm in diameter & 2 m long is subjected to an axial pull of 45 KN. find i) stress ii) strain iii) elongation Take E= 200 GPa.

Q.3 A steel bar 800 mm^2 cross sectional area is subjected to axial forces as shown in figure. find the total change in length of bar if E= 2 x 10^5 N/mm^2.



Q.4. Determine the total elongation of the bar as shown in figure. take E= 2 x 10^5 N/mm^2.



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Q.5. For a certain material the modulus of elasticity is 190 MPa. if the Poisson's ratio is 0.35 , calculate the modulus of rigidity & bulk modulus.

Q.6. A metal rod, 500mm long and 20mm in diameter, is subjected to an axial pull of 40 kN. Under this load, elongation of rod is 0.5mm and decrease in diameter of rod is 0.006mm. Calculate modulus of elasticity and Poisson's ratio.

Q.7. A steel bar 2m long , 20 mm wide & 10 mm thick is subjected to a pull of 20 KN in the direction of length. Find the change in length, breadth & thickness if
$E= 2 \times 10^5$ N/mm^2& 1/m=0.3.

Q.8. A steel bar 20 mm wide & 15 mm thick & 2m long is subjected to an axial pull of 35 KN if $E= 2 \times 10^5$ N/mm^2& μ=0.3. calculate the alteration in length, width & thickness of the bar.

Q.9. A cube of 100 mm side is subjected to stresses along three directions such that σ_x=80 N/mm^2(tensile), σ_y= 60 N/mm^2 (compressive) &σ_z= 40 N/mm^2 (compressive). calculate the strain in three directions .Take $E= 2 \times 10^5$ N/mm^2, 1/m= 0.25.

Q.10. A steel cube block of 50mm side is subjected to a force of 6 KN (tension), 8 KN (compression) and 4 KN (tension) long x, y and z directions respectively. Determine the change in the volume of the block. Take E as 200 KN/mm^2 and m as 10/3.

Q.11. A composite bar of length 500mm consists of a mild steel circular rod of 20mm dia. enclosed in a brass tube of 30mm external and 22mm internal diameter. The composite bar is subjected to an axial pull of 60kN. Find stresses in mild steel rod and brass tube. E_s = 210 GPa and E_{br} = 100 GPa.

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Q.12. A steel tube of 40 mm inside diameter and 4 mm metal thickness is filled with concrete. Determine the stresses in each material due to an axial thrust of 120 KN. Take modulus of Elasticity for steel and concrete as 2.1×10^5 N/mm^2 and 0.14×10^5 N/mm^2 respectively.

Q.13. A RCC column 400 mm × 400 mm is reinforced with 4 bars of 20 mm φ diameter. Determine the stresses induced in steel and concrete if it is subjected to an axial load of 500 KN. Take modular ratio $\frac{Es}{E_c} = 13.33$

Q.14. A R.C.C. column 450 mm diameter is reinforced with 6 bars of 16 mm diameter. Find the safe land that the column can carry. If permissible stresses in concrete and steel are 5 N/mm^2 and 125 N/mm^2 respectively. Take $E_c = 0.14 \times 10^5$ N/mm^2, $E_s = 2.1 \times 10^5$ N/mm^2

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